

Stratigraphic Evolution of Shelf, Shelf Edge and Upper Slope Deposits Associated with High-Relief Slope Clinofolds, Magallanes Basin, Chile

Dustin B. Bauer*

University of Calgary, Calgary, Alberta, Canada

dbbauer@ucalgary.ca

and

Stephen M. Hubbard

University of Calgary, Calgary, Alberta, Canada

Few examples of high-relief (>600 m) clinofolds have been studied in outcrop due to limited exposure and the resulting inability to recognize this extraordinary seismic-scale geometry. The Upper Cretaceous-Paleogene Dorotea and Tres Pasos formations of the Magallanes foreland basin, southern Chile, represent shelf and slope to basin floor deposits of a high-relief clinofold system. The Dorotea and Tres Pasos formations provide an opportunity to analyze the understudied bed-scale details of these extensive high-relief margin systems. The focus of this presentation is to characterize the architecture and sedimentology of these units and provide insight into analogous hydrocarbon-bearing strata from high-relief slopes on the margins of numerous basins (eg. Alaskan Brookian succession).

Shelf, shelf edge and upper slope deposits of the Dorotea and Tres Pasos formations are exposed along a depositional dip oriented outcrop belt ~12 km long. This seismic-scale outcrop exposure is examined using satellite imagery, photo mosaics and ~2300 m of detailed measured section from >50 outcrop locations. Evolution of the shelf-slope strata reveals a distinct change from low net/gross units deposited in a fluvially dominated deltaic system associated with erosionally based shelf edge and upper slope conduits (Fig. 1), to dominantly wave influenced deposits containing high net/gross sandstone accumulations and a paucity of upper slope channel facies. This change records the transition from a shelf with relatively low accommodation space associated with increased sediment bypass across the slope into deeper waters, to a scenario where the shelf was established as the main depo-zone for coarse-clastic material and the deep basin was starved of sediment. This shift in shelf accommodation space and sediment accumulation is likely linked to relative sea-level fluctuations, associated to tectonic activity in the adjacent fold-thrust belt. Through the detailed characterization of the sedimentology and facies distribution of the shelf, shelf edge and upper slope deposits in Magallanes Basin, insight is gained for the more accurate construction of predictive facies models for hydrocarbon reservoirs in analogous depo-zones worldwide.

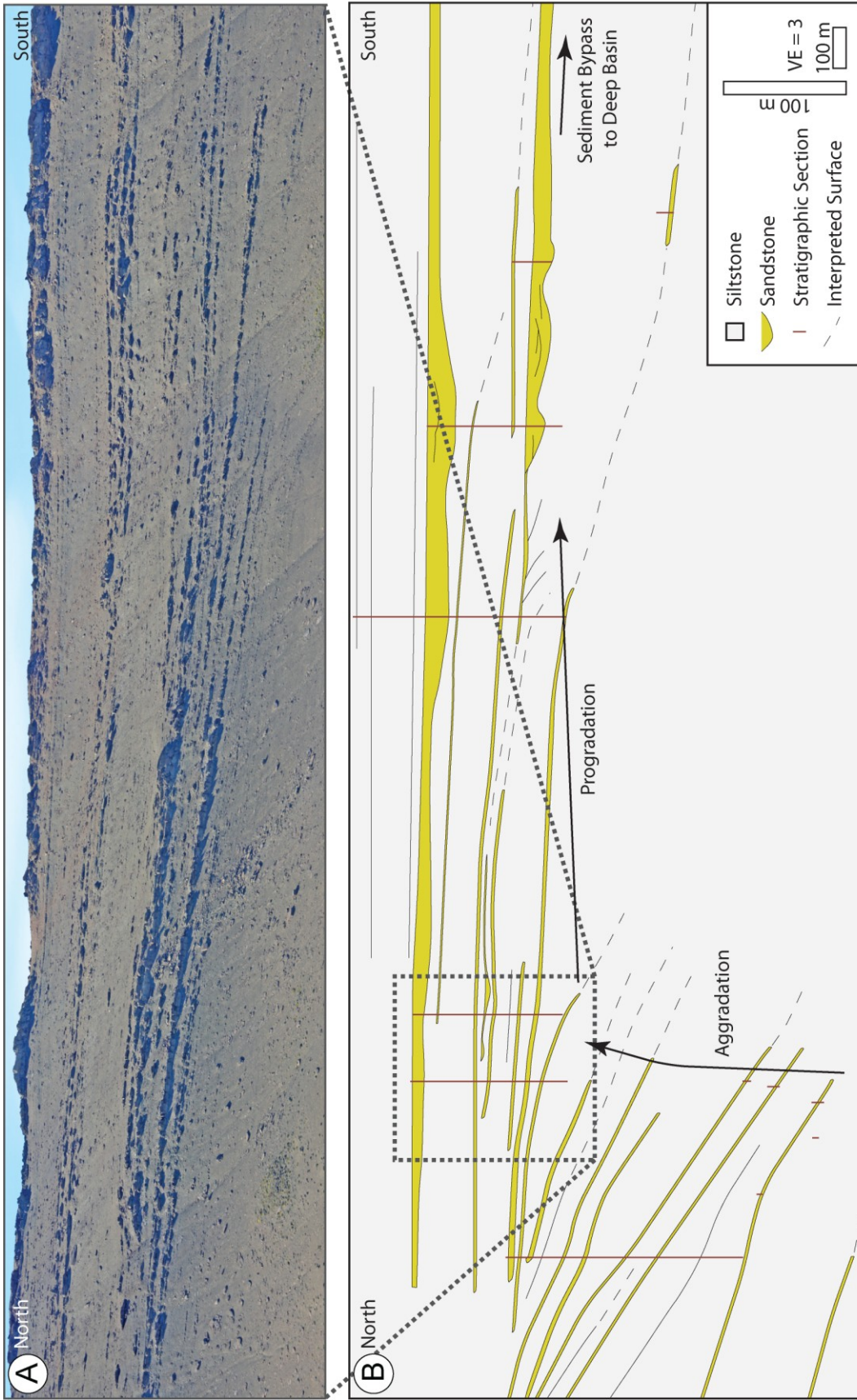


Figure 1. Depositional dip photo mosaic and cross-section of shelf, shelf edge and upper slope units on Cerro Cazador in the Magallanes Basin, Chile. A) Photo mosaic of fluvial dominated, prograding delta front sandstone and prodelta siltstone deposits. B) Cross-section of shelf, shelf edge and upper slope within the high relief clinoform system, showing delta front sandstone and prodelta siltstone deposits aggrading on a high accommodation shelf followed by progradation associated with increased sediment bypass to the deep basin. Photo mosaic location is outlined in dashed black lines on the cross-section.